

SN 10/715,733  
Docket No. S-102,311  
In Response to Office Action dated December 14, 2005

#### AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

#### LISTING OF CLAIMS:

Claim 1. (original) A process of preparing a solid composite including colloidal nanocrystals dispersed within a sol-gel host matrix, the process comprising:

admixing colloidal nanocrystals with an amphiphilic polymer including both hydrophobic groups and hydrophilic groups within a solvent to form an alcohol-soluble colloidal nanocrystal-polymer complex;

admixing the alcohol-soluble colloidal nanocrystal-polymer complex and a sol-gel precursor material; and,

forming said solid composite from said admixture.

Claim 2. (original) The process of claim 1 wherein said colloidal nanocrystals have a volume loading of up to about 30 percent by volume within said solid composite.

Claim 3. (original) The process of claim 1 wherein said hydrophilic groups are selected from the group consisting of -COOH, -OH, -SO<sub>3</sub>H, -NH<sub>2</sub>, and -PO<sub>3</sub>H<sub>2</sub>.

Claim 4. (original) The process of claim 1 wherein said sol-gel precursor material is selected from the group consisting of metal alkoxide compounds, metal halide compounds, and metal hydroxide compounds where the metal is selected from the group consisting of silicon, titanium, zirconium, aluminum, vanadium, iron, tin, tantalum, cerium, and chromium.

Claim 5. (original) The process of claim 1 wherein said colloidal nanocrystals are selected from the group consisting of M<sub>1</sub>X<sub>1</sub>, M<sub>1</sub>M<sub>2</sub>X<sub>1</sub>, M<sub>1</sub>M<sub>2</sub>M<sub>3</sub>X<sub>1</sub>, M<sub>1</sub>X<sub>1</sub>X<sub>2</sub>, M<sub>1</sub>M<sub>2</sub>X<sub>1</sub>X<sub>2</sub>, M<sub>1</sub>M<sub>2</sub>M<sub>3</sub>X<sub>1</sub>X<sub>2</sub>, M<sub>1</sub>X<sub>1</sub>X<sub>2</sub>X<sub>3</sub>, M<sub>1</sub>M<sub>2</sub>X<sub>1</sub>X<sub>2</sub>X<sub>3</sub>, and M<sub>1</sub>M<sub>2</sub>M<sub>3</sub>X<sub>1</sub>X<sub>2</sub>X<sub>3</sub>, where M<sub>1</sub>, M<sub>2</sub>, and M<sub>3</sub> are each selected from the group consisting of Zn, Cd, Hg, Al, Ga, In, Tl, Pb, Sn, Mg, Ca, Sr, Ba, mixtures and alloys thereof and X<sub>1</sub>, X<sub>2</sub>, and X<sub>3</sub> are each selected from the group consisting of S, Se, Te, As, Sb, N, P, mixtures and alloys thereof, Si, Ge, Au, Ag, Co, Fe, Ni, Cu, Mn and alloys of Au, Ag, Co, Fe, Ni, Cu, Mn or alloy combinations thereof.

Claim 6. (original) The process of claim 1 wherein said colloidal nanocrystals are of PbSe.

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Claim 7. (original) The process of claim 6 wherein said colloidal nanocrystals have a volume loading up to at least about 13 percent by volume within said solid composite.

Claim 8. (original) The process of claim 1 wherein the solid composite including colloidal nanocrystals uniformly dispersed within a sol-gel host matrix is characterized by maintaining a major portion of photoluminescent quantum yield exhibited by the colloidal nanocrystals prior to incorporation into the sol-gel host matrix.

Claim 9. (original) The process of claim 1 wherein said amphiphilic polymer is modified poly(acrylic acid) or modified poly(methacrylic acid), said modified poly(acrylic acid) or modified poly(methacrylic acid) including hydrophobic regions.

Claim 10. (original) The process of claim 9 wherein said amphiphilic polymer is an octylamine-modified poly(acrylic acid).

Claim 11. (original) The process of claim 1 wherein said sol-gel host is transparent.

Claim 12. (original) The process of claim 1 wherein said colloidal nanocrystals are uniformly dispersed within a sol-gel host.

Claim 13. (withdrawn) An alcohol-soluble colloidal nanocrystal-polymer complex comprising:  
colloidal nanocrystals and an amphiphilic polymer including hydrophilic groups selected from the group consisting of -COOH, -OH, -SO<sub>3</sub>H, -NH<sub>2</sub>, and -PO<sub>3</sub>H<sub>2</sub>.

Claim 14. (withdrawn) The alcohol-soluble colloidal nanocrystal-polymer complex of claim 13 wherein said colloidal nanocrystals are coated with said amphiphilic polymer.

Claim 15. (withdrawn) The alcohol-soluble colloidal nanocrystal-polymer complex of claim 13 wherein said colloidal nanocrystals are selected from the group consisting of M<sub>1</sub>X<sub>1</sub>, M<sub>1</sub>M<sub>2</sub>X<sub>1</sub>, M<sub>1</sub>M<sub>2</sub>M<sub>3</sub>X<sub>1</sub>, M<sub>1</sub>X<sub>1</sub>X<sub>2</sub>, M<sub>1</sub>M<sub>2</sub>X<sub>1</sub>X<sub>2</sub>, M<sub>1</sub>M<sub>2</sub>M<sub>3</sub>X<sub>1</sub>X<sub>2</sub>, M<sub>1</sub>X<sub>1</sub>X<sub>2</sub>X<sub>3</sub>, M<sub>1</sub>M<sub>2</sub>X<sub>1</sub>X<sub>2</sub>X<sub>3</sub>, and M<sub>1</sub>M<sub>2</sub>M<sub>3</sub>X<sub>1</sub>X<sub>2</sub>X<sub>3</sub>, where M<sub>1</sub>, M<sub>2</sub>, and M<sub>3</sub> are each selected from the group consisting of Zn, Cd, Hg, Al, Ga, In, Tl, Pb, Sn, Mg, Ca, Sr, Ba, mixtures and alloys thereof and X<sub>1</sub>, X<sub>2</sub>, and X<sub>3</sub> are each selected from the group consisting of S, Se, Te, As, Sb, N, P, mixtures and alloys thereof, Si, Ge, Au, Ag, Co, Fe, Ni, Cu, Mn and alloys of Au, Ag, Co, Fe, Ni, Cu, Mn or alloy combinations thereof.

Claim 16. (withdrawn) The alcohol-soluble colloidal nanocrystal-polymer complex of claim 13 wherein said colloidal nanocrystals are of PbSe.

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Claim 17. (original) A solid composite comprising the reaction product of (i) colloidal nanocrystals complexed with an amphiphilic polymer including both hydrophobic groups and hydrophilic groups and (ii) a sol-gel precursor material.

Claim 18. (original) The solid composite of claim 17 wherein said colloidal nanocrystals have a volume loading of up to about 30 percent by volume within said solid state composite.

Claim 19. (original) The solid composite of claim 17 wherein said hydrophilic groups are selected from the group consisting of -COOH, -OH, -SO<sub>3</sub>H, -NH<sub>2</sub>, and -PO<sub>3</sub>H<sub>2</sub>.

Claim 20. (original) The solid composite of claim 17 wherein the solid composite is characterized by maintaining a major portion of quantum yield exhibited by the colloidal nanocrystals prior to incorporation into the sol-gel precursor material.

Claim 21. (original) The solid composite of claim 17 wherein said colloidal nanocrystals are selected from the group consisting of M<sub>1</sub>X<sub>1</sub>, M<sub>1</sub>M<sub>2</sub>X<sub>1</sub>, M<sub>1</sub>M<sub>2</sub>M<sub>3</sub>X<sub>1</sub>, M<sub>1</sub>X<sub>1</sub>X<sub>2</sub>, M<sub>1</sub>M<sub>2</sub>X<sub>1</sub>X<sub>2</sub>, M<sub>1</sub>M<sub>2</sub>M<sub>3</sub>X<sub>1</sub>X<sub>2</sub>, M<sub>1</sub>X<sub>1</sub>X<sub>2</sub>X<sub>3</sub>, M<sub>1</sub>M<sub>2</sub>X<sub>1</sub>X<sub>2</sub>X<sub>3</sub>, and M<sub>1</sub>M<sub>2</sub>M<sub>3</sub>X<sub>1</sub>X<sub>2</sub>X<sub>3</sub>, where M<sub>1</sub>, M<sub>2</sub>, and M<sub>3</sub> are each selected from the group consisting of Zn, Cd, Hg, Al, Ga, In, Tl, Pb, Sn, Mg, Ca, Sr, Ba, mixtures and alloys thereof and X<sub>1</sub>, X<sub>2</sub>, and X<sub>3</sub> are each selected from the group consisting of S, Se, Te, As, Sb, N, P, mixtures and alloys thereof, Si, Ge, Au, Ag, Co, Fe, Ni, Cu, Mn and alloys of Au, Ag, Co, Fe, Ni, Cu, Mn or alloy combinations thereof.

Claim 22. (original) The solid composite of claim 17 wherein the colloidal nanocrystals are of PbSe.

Claim 23. (original) The solid composite of claim 17 wherein said amphiphilic polymer is modified poly(acrylic acid) or modified poly(methacrylic acid), said modified poly(acrylic acid) or modified poly(methacrylic acid) including hydrophobic regions.

Claim 24. (original) The solid composite of claim 23 wherein said amphiphilic polymer is an octylamine-modified poly(acrylic acid).

Claim 25. (original) The solid composite of claim 17 wherein said sol-gel precursor material is selected from the group consisting of metal alkoxide compounds, metal halide compounds, and metal hydroxide compounds where the metal is selected from the group consisting of silicon, titanium, zirconium, aluminum, vanadium, iron, tin, tantalum, cerium, and chromium.

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Claim 26. (original) The solid composite of claim 17 wherein said sol-gel precursor material is transparent.

Claim 27. (original) The solid composite of claim 17 wherein said colloidal nanocrystals are uniformly dispersed within a sol-gel host.